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SN 09/870,777
HOCKADAY et al.

Attached: Form PTO-2038 ($250)
Appeal Brief (27 pp); Three Appendices (7 pp)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

HOCKADAY et al.

Serial No.: 09/870,777 Art Unit: 1746

Filed: June 1, 2001 Examiner: M. Wills

For: CATALYTIC HYDROGEN VENT FILTER FOR BATTERIES

APPEAL BRIEF

02/16/2005 BBONNER 00000001 09870777

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REAL PARTY IN INTEREST

ENERGY RELATED DEVICES, INC., is the real party in interest in this case by virtue of an assignment recorded on reel/frame 011872/0759.

RELATED APPEALS AND INTERFERENCES

No other related appeal or interference is pending.

STATUS OF CLAIMS

Claims 1-3, 6-28, and 60 were finally rejected over references of record.

Claims 29-59 and 61-93 have been withdrawn from consideration.

Claim 5 has been indicated to be allowable.

A copy of the appealed claims is appended hereto in the CLAIMS APPENDIX.

STATUS OF AMENDMENTS

A Response, in which the only amendment to the claims was to place allowable claim 5 in independent form, was refused entry as indicated in the Advisory Action mailed November 17, 2004. The Advisory Action discusses group election issues but does not state why the amendment to place claim 5 in condition for allowance will not be entered. No other claim was amended.

SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention (Specification pages 2-20; Figures 1-7) relates to vent filter for batteries. The hydrogen selectively permeable membrane 14 is constructed by starting with a porous polycarbonate plastic film 1 Nucleopore Filter (Corning CoStar) with small 0.015 micron diameter pores 3 as shown in Figure 1 and Figure 2 (specification, page 14, lines 22-25). The pores 3 are formed by etching nuclear particle tracks in the plastic film 1. The pores 3 in this film 1 are 15 nm in diameter. Alternative substrate materials are: porous polyethylene (Tonen/Exxon/Mobile) with 0.03 micron diameter pores 3 and porous polyethersulfone ultra-filtration membranes (Pall Specialty Materials, 25 Harbor Park Drive, Port Washington, NY 11050). A hydrogen catalytic film 4, such as platinum less than 10 nm thick is sputtered onto the plastic film 1. Alternative catalyst films 4 of Pd, Pt/Ru, Pt/Sn and Pt/Ru/Mo alloys can be formed using sputter deposition (specification, page 15, lines 1-10).

This catalytic film 4 can be (100-1000 millitorr) sputtered under high pressure to increase the surface area of the deposit. The diffusion film 5 of an alloy of 77% Pd and 23% Ag is sputtered over the Pt film to form a film that plugs the pores and is 20 nm thick. Alternative materials for this film 5 are sputter deposited 23%Cu 77%Pd, or pure Pd. A hydrogen catalytic film 6, such as platinum, of less than 10 nm thick is sputtered onto the diffusion film 5 at pressures of 20 millitorr or less.

Alternative catalyst films 6 are Pt/Ru, Pt/Sn and Pt/Ru/Mo alloys (specification, page 15, lines 10-18).

This catalytic film 6 can be sputtered at high pressure (100-1000 millitorr) to increase its surface area. These metal coatings 4,5,6 can be deposited on either side of the plastic film 1 to give the porous membrane 1 two diffusion layers. A two-layer membrane can act to insure that random pinhole defects will not cause a leak hole. The assembly is thinly coated by dipping or painting with a gas permeable film 2 such as Nafion (Perfluorosulfonic Acid, DuPont Corporation (specification, page 15, lines 18-25).

The assembly is heat cured at 60°C for over one hour. This coating 2 can have advantageous selective gas permeability properties such as low permeability to water and high permeability to hydrogen. It has been found that by ion milling the gas permeable film 2 and then sputter depositing another hydrogen permeable 15 nm thick coating 7 of 77% Pd and 23% Ag or a repeated combination of catalysts films of Pt, 77% Pd and 23% Ag, and Pt sputtered in layers in film 7, over the gas permeable coating 2, the membrane 14 can be made free of a pinhole effect (specification, page 16, lines 8-17).

The coating 2 can be a porous and permeable film, such as silicone rubber Conformal Coat or PVC that acts as a diffuser but when heated under pressure forms the impermeable heat seal 20 at the rim of the membrane shown in Figure 5. The coating 2 can also be a microporous film, such as a microporous polypropylene

(3M Corporation, 3M Center Building, St. Paul, MN 55144-1000), or porous polyethylene (Tonen Chemical Nasu Co. Ltd., 1190-13 Oaza Iguchi Nishinasunoor, Nasu-gun, Tochigi-ken, 329-2763, Japan) coated with adhesives PVC (specification, page 17, lines 17-25), which acts as a diffuser but when heated and under pressure forms the impermeable heat seal 20 at the rim of the membrane (specification, page 17, lines 1-2).

As shown in Figure 3, the next step in the assembly is to mount the selectively permeable membrane 14 into the anode case plate 16 of the button cell battery. Figure 3 is a cross-sectional view of the porous gas diffusion mat sheets 13, 15 and the hydrogen selectively permeable membrane sheet 14 placed between a heated anvil 11 and the anode plate 16 in a vacuum chuck 18. The anvil is heated with an internal resistance heater 10. Sheets of porous gas diffusion mat material 13 and 15 that can also carry adhesive coatings can be placed above and below the hydrogen selective membrane 14. The gas porous or permeable coating 2 on the hydrogen selective membrane 14 may also be sufficient to act as a gas diffusion manifold over the membrane and the adhesive bonding or heat seal agent (specification, page 17, lines 3-15).

The anode plate 16 is prepared by having one or more small pinholes 17 fifty microns in diameter laser drilled in the anode plate 16. The anode plate 16 is held securely in the vacuum chuck 18 by drawing air out through the vacuum ports 19. The films are sealed to the anode plate by the heated anvil 11 coming

down and pressing the films against the anode plate. The rim of the anvil 12 has a knife-edge that cuts through the plastics 13,14,15 and separates the resulting membrane disk from the sheets of plastic 13,14,15. Then the heated anvil 11 is pulled away from the assembly of membranes 13, 14 and 15 to leave the assembly heat sealed to anode plate 16 (specification, page 17, lines 15-25). The assembly on the anode plate is then ejected from the vacuum chuck 18. The gas porous membranes 13, 15 and the selective membranes 14 sheets are moved laterally to move the punched hole away, and a new set of materials are assembled. A new anode plate 16 is placed in the vacuum chuck 18 and the process is repeated again (specification, page 18, lines 1-5).

A number of different techniques could be used in this membrane cutting and sealing operation. One technique is to use a concentric hold and cut arrangement in the anvil 11. The interior can have a sliding rod that initially comes down and holds the membranes firmly against the anode plate 16 and acts as a heat shield. The anvil 11 then slides down, heat-seals and cuts the membrane stack 13,14, 15 and 16. To avoid material sticking to the cutter as it is pulled away, the interior sliding rod and also the exterior ring holder continues to hold down the membrane (specification, page 18, lines 6-15).

A second technique to keep the membranes held down is to pressurize the interior of the anvil 11. When the anvil 11 is removed there is a gas puff that cools the heat seal. Gas puffs can also be used on the exterior of the anvil 11 to press the

membranes down at the moment the anvil is pulled up and thus avoid sticking (specification, page 18, lines 16-21).

A third technique is to hold the membrane down with the anvil 11 with the heat and welding energy coming from a focused laser beam swept around the perimeter of the anvil 11. The laser welding and cutting can be programmed; one can adjust power, position, and dwell time to heat fuse the membranes 13, 14, 15 (specification, page 18, lines 22-26) to the metal case 16 and trim the membranes 13, 14, 15 away from their sheet (specification, page 19, lines 1-2).

In Figure 5 a close up view of the assembled selective membrane 14 from the interior 22 of the anode plate 16 is shown heat-sealed 20 to the anode plate. The vent hole 17 is underneath the membrane and is shown in Figure 4 (specification, page 19, lines 3-6).

In Figure 4 the assembled selective membrane 14 on the anode plate 16 assembled into the button cell 28 behind the zinc electrode 23 is shown. The heat seal 20 of the selectively permeable membrane 14 to the anode plate 16 is shown. The selectively permeable membrane 14 is between the zinc electrode 23 and the vent hole 17 in the anode plate 16. Grooves or simple roughness of the zinc electrode provides gas collection channels 24. The zinc electrode 23 could also be porous to allow the gas to diffuse through it. The basic components of the button cell are shown: seal and insulator 21, electrolyte potassium hydroxide soaked mat 25, manganese dioxide electrolyte paste 26, the carbon

electrode 29 and cathode case plate 27 (specification, page 19, lines 7-18).

In Figure 7 the pressure valve relief membrane alternative arrangement is shown. The selectively permeable membrane 14 is sealed 31 to case 30 partially around the rim 32 of the selectively permeable membrane 14 (specification, page 19, lines 19-22).

In Figure 6b the pressure valve relief membrane arrangement is shown with the seal 31 in place and rim seal 33 opened. This would occur when the pressure is high enough in the battery to open the rim seal 33. The sealed region 31 is shown (specification, page 19, lines 23-26). The seal to the battery case 30, can be a seal such as silicone rubber on a smooth surface that gradually makes a gas tight seal. For this venting valve arrangement the case 30 will be dimpled in to accommodate the membrane being on the outside of the battery case 30. The pinhole 17 is shown under the porous gas diffusion membrane 15 and the selectively permeable membrane 14. A vented metal cover 35 can be spot welded over the dimpled case wall to protect the membrane 14 and allow for electrical contact with anywhere on the battery anode 22 case (specification, page 20, lines 1-9).

In Figure 6a the selectively permeable membrane 14 is shown sealed 31 against the case 30 (specification, page 20, lines 10-11).

GROUNDS OF REJECTION

I. Claims 1-3, 6-20, 23-28, and 60 stand rejected under 35 U.S.C. 102(e) as anticipated by Jones et al., (U.S. patent 6,660,425).

II. Claims 21 and 22 stand rejected under 35 U.S.C. 103(a) as obvious over Jones et al., (U.S. patent 6,660,425) in view of Lewin et al., (U.S. patent 5,916,704).

ARGUMENTS

I. Claims 1-3, 6-20, 23-28, and 60 are patentable under 35 U.S.C. 102(e) over Jones (US Patent 6,660,425).

The invention generally relates to a membrane battery vent, comprising a battery case, at least one perforation in the battery case, a porous substrate adjacent the perforation in the battery case for venting batteries, and a gas selective permeable membrane integral with the porous substrate. The present invention further defines a catalytic layer and a diffusion layer on the selectively permeable membrane forming a gas recombination mechanism for recombining gases evolved from within the battery case and for venting the battery.

Claim 1

Claim 1 describes a membrane battery vent, comprising a battery case, at least one perforation in the battery case, a porous substrate adjacent the perforation in the battery case for venting batteries, a gas selective permeable membrane integral with the porous substrate, further comprising a catalytic layer and a diffusion layer on the membrane forming a gas recombination mechanism for recombining gases evolved from within the battery case and for venting the battery. Jones does not describe nor teach all of those claimed features as pointed out below.

Claim 28

Claim 28 describes a gas vent for batteries, comprising a sealed battery container, a perforation in the sealed battery container, a gas selective permeable catalytically active membrane vent and gas recombination mechanism for batteries,

integral with a porous substrate and covering the perforation in the sealed battery container and a perimeter seal extending at least partially around the membrane, and sealing at least a peripheral portion of the membrane vent to the battery container around the perforation. Jones does not describe nor teach all of those claimed features as pointed out below.

Jones relates to a battery cell having a housing, positive and negative electrodes spaced in the housing, electrolyte in the housing, a gas space in the housing for collecting hydrogen and oxygen gas, a pressure relief valve for venting gas from the housing and for preventing oxygen from entering the negative electrode, a container in the housing holding a catalyst being in gas communication with the oxygen and hydrogen in the gas space, and a catalyst poison filter in the chamber to be in contact with the oxygen and hydrogen in the gas space. Jones also has a microporous single piece plastic section hydrophobic to the electrolyte and having pores to allow oxygen and hydrogen gas to pass from the gas space into the catalyst chamber.

Nowhere in the entire Jones reference there is description, teaching, suggestion or even by remote inherence any indication of venting the battery housing through the selectively permeable membrane formed on the porous substrate adjacent to the opening (vent) in the housing.

For an invention to be anticipated, it must be demonstrated that each and every element of the claimed invention is present in the "four corners" of a single prior art, either expressly

described therein or under the principle of inherency. Lewmar Marine Inc. v Barient Inc., 3 USPQ2d 1766, 1767-1768 (CAFC, 1987). The absence from prior art reference any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible, Inc., 230 USPQ 81, 84 (Fed. Cir. 1986).

Claim 27

Claim 27 describes a battery vent comprising a battery case having at least one opening and a gas selective permeable catalytically active gas recombination membrane secured over the opening in the battery case for venting batteries. Jones does not describe or teach a battery venting apparatus as pointed out below.

Claim 60

Claim 60 describes a battery vent apparatus comprising a battery case having at least one opening and a gas selective permeable catalytically active gas recombination membrane secured over the opening in the battery case for venting batteries. Jones does not describe or teach a battery venting apparatus as pointed out below.

The Examiner picks different elements from Jones that have nothing to do with the claimed invention and then holds the different elements to anticipate the claimed invention even though the elements have nothing to do with the claimed invention and its components.

For example, the Examiner equates the Jones element 68 to be the claimed perforation. However, Jones describes element 68 to

be a gas space which is required for working in conjunction with the catalytic chamber as taught by Jones. The Examiner relies on column 4, lines 41-60 for the gas permeable membrane.

However, column 4, lines 41-60, in fact, provides the differences between the claimed invention and the Jones device. For example, those lines describe figure 1 in which device 10 has a cylindrical container 14 attached to flange 16, with internal chamber 22 having an opening 20. Container 14 is of sulfuric acid resistant material because it is disposed inside the battery. Micro-porous section 30 allows gas and vapor to pass from the inside of the battery into chamber 22. Section 30 is disk shaped and has a member 30a heat sealed to the opening 20 of chamber 22. member 30a is porous, plastic, hydrophobic and allows gas and vapor to pass through but not liquids. Member 30 completely seals catalyst 26 within chamber 22. Filter 28 is positioned between catalyst 26 and member 30a. Jones expressly teaches that member 30a forms an anti hydrogen flame barrier.

The Jones catalyst layer will be of use only if both oxygen and hydrogen pass through the member for the catalytic reaction to occur and for the two to combine and form water vapor. Thus, Jones cannot, does not, and will not allow only hydrogen to pass through the member into the catalytic chamber 22.

Also, the Examiner misconstrues the Jones catalytic chamber with its opening 20 to be the claimed battery vent. Jones expressly provides a one-way valve for venting the battery which has nothing to do with the catalytic chamber 22 opening 20. In

fact, Jones admits in column 6, lines 14-16, that attaching the catalyst device 10 to the pressure release valve is not possible. And yet, the Examiner treats the valve and the catalytic chamber opening to be interchangeable, which is in error.

In Figure 8 the catalyst device 10 is attached to the pressure relief valve 12 which allows excess gas to escape rather than selectively permeable gas to vent. Catalyst 26 in the device 10 is in gas communication with the interior of the cell 60 being positioned in the gas space 68 in the housing where oxygen and hydrogen gas collect. Nowhere does Jones describe, teach, or suggest that the member 30a selectively permits gas egress to the pressure relief valve for venting the batteries. Thus, nothing in Jones, describes, teach or suggests the claimed invention and therefore the reference cannot anticipate the present claims.

To be anticipating, a prior art reference must disclose "each and every limitation of the claimed invention[,]... must be enabling[,] and must describe...[the] claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention." In re Paulsen, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

Claim 2

Claim 2 adds that the membrane passes hydrogen gas preferentially over other gases. Jones has a pore size that allows gas and vapor to pass but not liquids, which is inapposite to allowing hydrogen gas to pass preferentially.

Claim 3

Claim 3 adds that the membrane passes hydrogen gas preferentially over other gases of water, carbon dioxide, and oxygen. Jones has a pore size that allows gas and vapor to pass but not liquids, which is inapposite to allowing hydrogen gas to pass preferentially over all the things allowed by Jones.

Claim 6

Claim 6 adds that the membrane further comprises a catalytic surface from catalysts metals from the transition metal elements, one or more components of platinum, palladium, nickel, copper, silver, chromium, molybdenum, tungsten, cobalt, iron, ruthenium, titanium, zirconium, vanadium, niobium, tantalum, or be alloyed with elements such as carbon, silicon and tin for acting as a gas recombination mechanism of the gases hydrogen and oxygen evolved from within the battery case. Jones does not teach nor inherently provide all the elements of claim 6.

Claim 7

Claim 7 adds that the membrane is formed by coating a porous substrate, which is not taught nor described by Jones.

Claim 8

Claim 8 adds that the membrane is formed by coating a porous substrate with selectively permeable materials. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 9

Claim 9 adds that the membrane is formed by coating and plugging pores of a substrate of etched nuclear particle track dielectric films with selectively permeable materials. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 10

Claim 10 adds that the membrane is formed by coating and plugging pores of a substrate, porous plastics, porous metals, porous glasses, porous ceramics, or porous semiconductors, with selectively permeable materials. Jones does not teach nor inherently provide all the elements of claim 10.

Claim 11

Claim 11 adds that the membrane is formed by coating and plugging pores of a substrate, etched nuclear particle track dielectric films of polycarbonate plastic, polyester, polyimide, or polypropylene, with selectively permeable materials. Jones does not teach nor inherently provide all the elements of claim 11.

Claim 12

Claim 12 adds that the membrane is formed by coating and plugging pores of a substrate, of porous polyethylene, porous polyethersulfone, with selectively permeable materials. Jones does not teach nor inherently provide all the elements of claim 12.

Claim 13

Claim 13 adds that the membrane is formed by coating a porous substrate with selectively hydrogen permeable materials selected from the transition metals, transition metal compounds or alloys. Jones does not teach nor inherently provide all the elements of claim 13.

Claim 14

Claim 14 adds that the membrane is formed by coating a porous substrate with vacuum deposited selectively permeable materials of Pt, Pd and its alloys, Pd/Ag alloy, Pd/Cu alloy, Ti/Ni alloy, AB_2 (e.g. $ZrMn_2$) or AB_5 (e.g. $LaNi_5$) coatings, La, Ti, Zr, V, Nb, Ta, Cr, Mo, W, Fe, Ru, or Co. Jones does not teach nor inherently provide all the elements of claim 14.

Claim 15

Claim 15 adds that the membrane has a gas permeable coating on it. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 16

Claim 16 adds that the membrane further comprises a gas permeable coating of silicone rubber, polyvinyl chloride, polyethylene, fluorosilicone, nitrile silicone, natural rubber, polytetrafluroethylene, polymer electrolytes, or perfluorosulfonic acid. Jones does not teach nor inherently provide all the elements of claim 16.

Claim 17

Claim 17 adds that the membrane further comprises electrolytes in contact with selective permeable films for electrochemical catalysis of hydrogen, or oxygen or catalytic promotion of hydrogen oxygen recombination. Jones does not teach nor inherently provide all the elements of claim 17.

Claim 18

Claim 18 adds that the membrane further comprises a gas permeable coating of electrolytes in contact with selective permeable films for electrochemical catalysis of hydrogen, or oxygen or catalytic promotion of hydrogen oxygen recombination also provides the diffusion layer for limiting recombination to a surface of catalysts or rate of recombination. Jones does not teach nor inherently provide all the elements of claim 18. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 19

Claim 19 adds that the membrane further comprises a non-selective gas permeable coating and hydrogen selectively permeable coating coated over a non-selective gas permeable coating. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 20

Claim 20 adds that the membrane further comprises diffusion gas mats placed on the membrane, which is not taught nor described by Jones.

Claim 23

Claim 23 adds that the membrane is formed by coating and plugging pores of a porous substrate, thereby forming a porous membrane, and further comprising layers of selectively permeable materials on the substrate and gas diffusion mats, sealed to the substrate and sealed to the battery case for diffusing gas through the perforation in the battery case. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber.

Claim 24

Claim 24 adds that the membrane is formed by coating and plugging pores of substrate, etched nuclear particle track dielectric films with selectively permeable materials, and further comprising gas diffusion mats sealed to the membrane and to the battery case for diffusing gas through a vent hole in the battery case. Jones' filter material does not coat any substrate and is disposed between the catalyst and the opening in the chamber. Jones has no vent as pointed out above.

Claim 25

Claim 25 adds that the membrane further comprises a pressure relief valve, which is not taught by Jones.

Claim 26

Claim 26 adds that the membrane forms a pressure relief valve or burst foil, which is not taught by Jones.

For most of the rejections the Examiner relies on inherency as a basis for Jones anticipating the claimed features. However,

"To establish inherency, the extrinsic evidence 'must make it clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.'" In re Robertson, 48 USPQ2d 1949, 1951 (Fed. Cir. 1999) quoting from Continental Can Co. v. Monsanto Co., 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Id. 20 USPQ2d at 1749.

II. Claims 21 and 22 are patentable under 35 U.S.C. 103(a) over Jones (US Patent 6,660,425) and Lewin (US Patent 5,916,704).

As pointed out above, Jones does not describe, teach nor suggest the claimed invention. Therefore, any further combination of Jones with other references will also teach away from the claimed invention.

"It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." In re Fritch, 23 USPQ2d 1783, 1784 (CAFC, August 1992), quoting from In re Gorman, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). "This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." Id. quoting from In re Fine, 5 USPQ2d 1600 (CAFC, 1988).

Lewin relates to a low pressure battery vent for flexible containers. The container has a venting aperture. An external seal is formed on the aperture with a vent structure. The vent structure has a chemically inert plastic film layer with a central aperture aligned with the vent aperture and adhered to the flexible container. A second film inert layer is adhered to the first layer such that it covers the vent and aperture but has a partial opening for a venting pathway from the aperture to the ambient atmosphere. The second film is releasably adhered to the first film for the venting.

Citing In re Gordon, 221 USPQ, 1127, the court pointed out, "the mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification". In re Fritch, 23 USPQ2d 1783, 1784 (CAFC, August 1992). In the same case, In re Gordon, the court found a proposed modification inappropriate for an obviousness inquiry when the modification rendered the prior art reference inoperable for its intended purpose.

Claim 21

Claim 21 describes a seal for sealing the membrane to the battery case and for diffusing gas through the perforation in the battery case, which is not taught nor suggested by the combined teachings of Jones and Lewin.

Claim 22

Claim 22 defines the seal is provided with a heat or pressure stamp at least partially around the perforation in the battery case, which is not taught nor suggested by the combined teachings of Jones and Lewin.

The teachings of Jones and Lewin cannot be combined in the manner proposed by the Examiner because the two teachings are inapposite. Jones mandates a catalyst chamber and a separate venting one-way valve where the chamber must be disposed inside the battery case in communication with the gas space. Lewin requires a venting apparatus that must be disposed outside the venting aperture for that device to work. It is not understood where in the combined teachings there is basis for the Examiner's holding that would render claims 21 and 22 obvious.

If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent. In re Oetiker, 25 USPQ2d 1443, 1447 (Fed. Cir. 1992) citing In re Grabiak, 226 USPQ 870, 873 (Fed. Cir. 1985). In fact, the office action does not provide any basis for the rejection of each of the features in every dependent claim and therefore Applicant is unable to determine the Examiner's basis for the rejection of each of the claims to adequately rebut the rejections. Therefore, as dictated by Oetiker "without more applicant is entitled to grant of the patent."

SUMMARY

Each of the present claims is patentable under 35 U.S.C. 102(e) over the prior art of record.

When considering the present invention as a whole and the prior art to which the invention pertains as a whole, when considering the differences between the present invention and the prior art, and when considering the level of ordinary skill in the art to which the invention pertains, it is clear that the invention would not have been obvious under 35 U.S.C. 103(a) to a person having ordinary skill in the art at the time the invention was made.

CONCLUSION

Reversal of the Examiner and allowance of all the claims are respectfully requested.

Respectfully,

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CLAIMS APPENDIX

Appealed Claims:

1. A membrane battery vent, comprising a battery case, at least one perforation in the battery case, a porous substrate adjacent the perforation in the battery case for venting batteries, a gas selective permeable membrane integral with the porous substrate, further comprising a catalytic layer and a diffusion layer on the membrane forming a gas recombination mechanism for recombining gases evolved from within the battery case and for venting the battery.

2. The membrane of claim 1, wherein the membrane passes hydrogen gas preferentially over other gases.

3. The membrane of claim 1, wherein the membrane passes hydrogen gas preferentially over other gases of water, carbon dioxide, and oxygen.

6. The membrane of claim 1, wherein the membrane further comprises a catalytic surface from catalysts metals from the transition metal elements, one or more components of platinum, palladium, nickel, copper, silver, chromium, molybdenum, tungsten, cobalt, iron, ruthenium, titanium, zirconium, vanadium, niobium, tantalum, or be alloyed with elements such as carbon, silicon and tin for acting as a gas recombination mechanism of the gases hydrogen and oxygen evolved from within the battery case.

7. The membrane of claim 1, wherein the membrane is formed by coating a porous substrate.

8. The membrane of claim 1, wherein the membrane is formed by coating a porous substrate with selectively permeable materials.

9. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of a substrate of etched nuclear particle track dielectric films with selectively permeable materials.

10. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of a substrate, porous plastics, porous metals, porous glasses, porous ceramics, or porous semiconductors, with selectively permeable materials.

11. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of a substrate, etched nuclear particle track dielectric films of polycarbonate plastic, polyester, polyimide, or polypropylene, with selectively permeable materials.

12. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of a substrate, of porous polyethylene, porous polyethersulfone, with selectively permeable materials.

13. The membrane of claim 1, wherein the membrane is formed by coating a porous substrate with selectively hydrogen permeable materials selected from the transition metals, transition metal compounds or alloys.

14. The membrane of claim 1, wherein the membrane is formed by coating a porous substrate with vacuum deposited selectively

permeable materials of Pt, Pd and its alloys, Pd/Ag alloy, Pd/Cu alloy, Ti/Ni alloy, AB_2 (e.g. $ZrMn_2$) or AB_5 (e.g. $LaNi_5$) coatings, La, Ti, Zr, V, Nb, Ta, Cr, Mo, W, Fe, Ru, or Co.

15. The membrane of claim 1, wherein the membrane has a gas permeable coating on it.

16. The membrane of claim 1, wherein the membrane further comprises a gas permeable coating of silicone rubber, polyvinyl chloride, polyethylene, fluorosilicone, nitrile silicone, natural rubber, polytetrafluroethylene, polymer electrolytes, or perfluorosulfonic acid.

17. The membrane of claim 1, wherein the membrane further comprises electrolytes in contact with selective permeable films for electrochemical catalysis of hydrogen, or oxygen or catalytic promotion of hydrogen oxygen recombination.

18. The membrane of claim 1, wherein the membrane further comprises a gas permeable coating of electrolytes in contact with selective permeable films for electrochemical catalysis of hydrogen, or oxygen or catalytic promotion of hydrogen oxygen recombination also provides the diffusion layer for limiting recombination to a surface of catalysts or rate of recombination.

19. The membrane of claim 1, wherein the membrane further comprises a non-selective gas permeable coating and hydrogen selectively permeable coating coated over a non-selective gas permeable coating.

20. The membrane of claim 1, wherein the membrane further comprises diffusion gas mats placed on the membrane.

21. The membrane of claim 1, further comprising a seal for sealing the membrane to the battery case and for diffusing gas through the perforation in the battery case.

22. The membrane of claim 21, wherein the seal is provided with a heat or pressure stamp at least partially around the perforation in the battery case.

23. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of a porous substrate, thereby forming a porous membrane, and further comprising layers of selectively permeable materials on the substrate and gas diffusion mats, sealed to the substrate and sealed to the battery case for diffusing gas through the perforation in the battery case.

24. The membrane of claim 1, wherein the membrane is formed by coating and plugging pores of substrate, etched nuclear particle track dielectric films with selectively permeable materials, and further comprising gas diffusion mats sealed to the membrane and to the battery case for diffusing gas through a vent hole in the battery case.

25. The membrane of claim 1, wherein the membrane further comprises a pressure relief valve.

26. The membrane of claim 1, wherein the membrane forms a pressure relief valve or burst foil.

27. A battery vent comprising a battery case having at least one opening and a gas selective permeable catalytically

active gas recombination membrane secured over the opening in the battery case for venting batteries.

28. A gas vent for batteries, comprising a sealed battery container, a perforation in the sealed battery container, a gas selective permeable catalytically active membrane vent and gas recombination mechanism for batteries, integral with a porous substrate and covering the perforation in the sealed battery container and a perimeter seal extending at least partially around the membrane, and sealing at least a peripheral portion of the membrane vent to the battery container around the perforation.

60. A battery vent apparatus comprising a battery case having at least one opening and a gas selective permeable catalytically active gas recombination membrane secured over the opening in the battery case for venting batteries.

EVIDENCE APPENDIX

Original application, office actions, responses and references of record.

RELATED PROCEEDINGS APPENDIX

NONE